

## REPORT DOCUMENTATION PAGE

AFRL-SR-BL-TR-01-

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including its usefulness, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Project, Washington, DC 20503.

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Information

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE	3. REPORT TYPE AND DATES COVERED 15 November 1996 - 14 November 1997	
4. TITLE AND SUBTITLE Proposal for Sponsoring in First International Conference in DNS/LES			5. FUNDING NUMBERS F49620-97-1-0034	
6. AUTHOR(S) Dr. Chaoqun Liu				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Department of Mathematics and Statistics Louisiana Tech University P.O. Box 3189 Ruston, LA 71272			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) AFOSR/NM 801 N. Randolph Street Room 732 Arlington, VA 22203-1977			10. SPONSORING/MONITORING AGENCY REPORT NUMBER  F49620-97-1-0034	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION AVAILABILITY STATEMENT APPROVED FOR PUBLIC RELEASE, DISTRIBUTION UNLIMITED				
12b. DISTRIBUTION CODE (AFOSR) AIR FORCE OFFICE OF SCIENTIFIC RESEARCH NOTICE OF TRANSMITTAL DTIC. THIS TECHNOLOGY HAS BEEN REVIEWED AND IS APPROVED FOR PUBLIC RELEASE LAW AFR 100-12. DISTRIBUTION IS UNLIMITED.				
13. ABSTRACT (Maximum 200 words) The FIRST AFOSR INTERNATIONAL CONFERENCE ON DIRECT NUMERICAL SIMULATION (DNS) AND LARGE EDDY SEMULATION (LES) (FAICDL), sponsored by the US Air Force Office of Scientific Research (AFOSII), was held in Louisiana Tech University, Ruston, Louisiana, USA on August 4-8, 1997. The conference attracted 93 participants from 16 countries all over the world including most leading scientists in the area of DNS and LES. Direct Numerical Simulation (DNS) refers to accurate numerical solution of three dimensional, time-dependent Navier-Stokes equations for both flow transition and turbulence. DNS is the only numerical approach dealing with the exact solution of 3-D time-dependent N-S equations without any ad hoc assumption and in which all time and space length scales are taken into account.				
14. SUBJECT TERMS			15. NUMBER OF PAGES 5	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT		18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

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## FINAL REPORT

Project Title: Proposal for Sponsoring the First  
International Conference on DNS/LES

Principal Investigator: Dr. Chaoqun Liu

Institution: Department of Mathematics and Statistics  
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Date: 3/11/2000

## Final Report on AFOSR Grant F49620-97-1-0034

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Department of Mathematics and Statistics  
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Ruston, LA 71272

### 1 INTRODUCTION

The FIRST AFOSR INTERNATIONAL CONFERENCE ON DIRECT NUMERICAL SIMULATION (DNS) AND LARGE EDDY SIMULATION (LES) (FAICDL), sponsored by the US Air Force Office of Scientific Research (AFOSR), was held in Louisiana Tech University, Ruston, Louisiana, USA on August 4-8, 1997.

The conference attracted 93 participants from 16 countries all over the world including most leading scientists in the area of DNS and LES.

Direct Numerical Simulation (DNS) refers to accurate numerical solution of three-dimensional, time-dependent Navier-Stokes equations for both flow transition and turbulence. DNS is the only numerical approach dealing with the exact solution of 3-D time-dependent N-S equations without any ad hoc assumption and in which all time and space length scales are taken into account.

Large Eddy Simulation (LES) is a technique for extending turbulence simulation to higher Reynolds numbers than those can be achieved by DNS. Its effectiveness relies on representing the smallest scales of turbulent motion by a sub-grid model.

DNS or LES was thought useful only for low Reynolds number flow and simple geometry. However, during the past decade, the capability of DNS and LES for flow prediction has been dramatically enhanced as a result of rapid advancement in computer technology and numerical algorithm. Nowadays, more and more researchers apply DNS or LES for more general geometries and higher Reynolds numbers.

To promote the advancement of DNS/LES technique and stimulate the application of DNS/LES for engineering interest, AFOSR sponsored the DNS/LES international conference. The first conference was held in August 1997 in Louisiana Tech University, Ruston, LA. The written papers were published in Advances in DNS/LES, Greyden Press, edited by C. Liu, Z. Liu and L. Sakell.

This AFOSR sponsored conference and proceedings have significantly promoted the DNS/LES research and encouraged CFD researchers to use DNS/LES for engineering applications.

## 2 CONFERENCE TOPICS

- DNS/LES toward understanding fundamental flow physics
- DNS/LES for complex flows
- DNS/LES for flow transition
- DNS/LES for fully developed turbulent flow
- DNS/LES for aeroacoustics
- DNS/LES for heat transfer applications
- DNS/LES for combustion applications
- LES for atmospheric boundary layers
- DNS/LES for engineering applications
- DNS/LES for transition and turbulence modeling
- Development on filter and subgrid model for LES
- Boundary condition treatment for DNS/LES
- Numerical algorithm developments for DNS/LES
- Parallel computation implementations/applications for DNS/LES

## 3 INVITED SPEAKERS:

We supported 18 well-known invited speakers: N.A. Adams, J. Chasnov, H. Fasel, T. Herbert, K. Horiuti, K. Jansen, G. Karniadakis, A. Johansson, R. Joslin, M. Lesieur, R. Mankbadi, Y. Miyake, F. Nieuwstadt, U. Piomelli, H. Reed, P. Spalart, C. Streett, Z. Zhang.

## 4 STUDENT SUPPORT:

We provide 8 scholarships to support graduate students to attend the conference.

## 5 SCIENTIFIC COMMITTEE:

- Liu, Chaoqun, Chair (Louisiana Tech )
- Sakell, Len, Co-Chair (AFOSR)
  
- Chasnov, Jeff (Hong Kong)
- Fasel, Hermann (University of Arizona)
- Herbert, Thorwald (Ohio State University)
- Jansen, Kenneth (RPI)
- Johansson, Arne (Sweden)
- Joslin, Ronald ( NASA Langley Research Center)
- Karniadakis, George (Brown University)
- Knight, Doyle (Rutgers University )
- Lesieur, Marcel (France)
- Lin, San-Yih (ChengKung University )
- Liu, Zhining (Louisiana Tech)
- Mankbadi, Reda (Egypt)
- Miyake, Yutaka (Japan)
- Nieuwstadt, Frans (Netherlands)
- Piomelli, Ugo (University of Maryland)
- Povinelli, Lou ( NASA Lewis Research Center)
- Reed, Helen (Arizona State University)
- Shang, Joe (Wright-Patterson AFB)
- Streett, Craig ( NASA Langley Research Center)
- Zhang, Zhaoshun (China)

## 6 CONFERENCE SPENDING REPORT

The support from AFOSR is \$21,000 and the real spending is listed as follows:

Travel expenses for invited speakers :	\$10,000
Advertizement :	\$3,000
Proceedings:	\$6,000
Materials :	\$1,000
Phones and fax:	\$ 500
Support for student participants :	\$5,000
Secretarial support :	\$3,000
Food and Drinks:	\$1,500
 Total expenses :	 \$30,000
Registration fees collected :	-\$9,000
AFOSR support :	-\$21,000
 Balance	 \$0